1 Book reviews

Interpolation, Identification and Sampling
J.R. Partington
London Mathematical Society Monographs, New Series, 17, Oxford University Press, Oxford, UK, 1997, ISBN 0-19-850024-6, xii+267 pages, Hardback GBP 60.

As the title suggests, the problems considered are definitely inspired by problems in (linear) system theory and signal processing. Identification, model reduction, optimal control, input design, basis pursuit, and many related topics have reached a mathematical maturity that allows a pure mathematical treatment. The book is written in the first place (by a mathematician) for mathematicians who are interested in these applications. However, the systems or signal processing engineer with some mathematical background will be delighted to find here all the mathematics he always wanted to learn, but did not know where to start. The material is presented in such a way that it is accessible for any application minded mathematician or theory inclined engineer from graduate level. Without being verbose, the necessary concepts are introduced first, so that even the non-specialist will understand and appreciate the results presented. To be more concrete: first the necessary function spaces and interpolation problems from classical complex analysis are introduced and these form the backbone of the book. This is applied to the general problem of recovery: given some data, can one recover the function which generated these data, or rather: is it possible to generate a sequence of approximants from the data that converge to the unknown function. This theory is then applied to problems of worst-case identification, Hankel-norm approximation, input design, robust sampling theory, and many more of these problems. All this sounds very applied, and indeed it is, but besides the motivating formulation, the actual discussion is given in terms of n-widths, equicontinuous operators, balayage measures, Schauder bases, frames, and mathematical objects of this style. It is only in a relatively short concluding chapter that more concrete applied problems are discussed in some details.

A. Bultheel

Advanced Topics in Difference Equations
Ravi P. Agarwal and Patricia J. Y. Wong
Kluwer Academic Publishers, Dordrecht 1997, ISBN : 0-7923-4521-5, 520 pages, Hardbound GBP 146.

Over the last few years difference equations have become very popular. Books and (a lot of) papers are written about them, conferences on the subject are being held, there is even a journal on difference equations. One of the specialists in the field is without doubt Ravi P. Agarwal. His previous book "Difference Equations and Inequalities" (1992) is a survey of the theory of difference equations and contains a wealth of information for the researcher. This new book, co-authored by Patricia J. Y. Wong, can be seen as an update of the first one. But as the authors say in their introduction, the subject has grown so much during the last four years, that it is impossible to write a similar survey. Instead they present us with a collection of recent results on the subject, with special emphasis on periodicity of solutions, variation of parameter methods, oscillation of solutions and boundary value problems. The types of difference equations studied include: partial difference equations, neutral delay difference equations, nonlinear difference equations, and generalized linear systems. The book is divided into 40 sections, each of which contains a number of interesting results. However, there doesn't seem to be a thread running through the book, connecting the different sections, apart from the fact that sections which treat related subjects are grouped. It feels as if you're reading the proceedings of a conference, paper after paper. Another thing that troubles me in this book is that there is no index. A book that contains such a large number of results on quite a lot of different subjects should at least contain an index to help the reader in finding what he/she is looking for. Now all we have is the table of contents, with titles like 'convergence to equilibria' which really doesn't tell us much. However, I'm sure that the results in this book are of great interest to other specialists in the field. This book offers an easy way to get access to them.

P. Levrie